

# CRS

## Coalescing-Style Air and Sediment Separator



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# Table of Contents

1	Introduction and Safety.....	2
1.1	Introduction.....	2
1.2	Safety terminology and symbols.....	2
1.3	User safety.....	3
1.4	Protecting the environment.....	3
1.5	Spare parts.....	3
1.6	End of life product disposal.....	3
2	Transportation and Storage.....	4
2.1	Examine the delivery.....	4
2.1.1	Examine the package.....	4
2.1.2	Examine the unit.....	4
2.2	Storage guidelines.....	4
3	Product Description.....	5
3.1	Product overview.....	5
3.2	Process description.....	5
3.3	Parts.....	6
3.4	Operational limits.....	6
4	Installation.....	7
4.1	Precautions.....	7
4.2	Prerequisites.....	8
4.3	Install the CRS.....	8
4.4	Pipe hanging installation.....	8
4.5	Install the insulation.....	9
5	Operation.....	10
5.1	Precautions.....	10
5.2	Start up of the system.....	10
5.3	System venting and purging.....	10
6	Maintenance.....	11
6.1	Precautions.....	11
6.2	Examine the CRS.....	11
6.3	Clean the coalescing medium.....	11
6.3.1	Close the isolation valve.....	11
6.3.2	Drain the fluid.....	11
6.3.3	Remove the coalescing medium.....	11
6.3.4	Install the CRS.....	11
6.4	Clean the magnetic insert.....	12
6.4.1	Close the isolation valve.....	12
6.4.2	Remove the magnetic insert.....	12
6.4.3	Drain the fluid.....	13
6.4.4	Install the magnetic insert.....	13
6.5	Service the air bleed ports or drain plugs.....	13

# 1 Introduction and Safety

## 1.1 Introduction

### Purpose of the manual

The purpose of this manual is to provide the necessary information for working with the unit. Read this manual carefully before starting work.

### Read and keep the manual

Save this manual for future reference, and keep it readily available at the location of the unit.

### Intended use



#### **WARNING:**

Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment and the surroundings. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact a Xylem representative before proceeding.

### Other manuals

See also the safety requirements and information in the original manufacturer's manuals for any other equipment furnished separately for use in this system.




## 1.2 Safety terminology and symbols

### About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:



- Personal accidents and health problems
- Damage to the product and its surroundings
- Product malfunction

### Hazard levels

Hazard level	Indication
 <b>DANGER:</b>	A hazardous situation which, if not avoided, will result in death or serious injury
 <b>WARNING:</b>	A hazardous situation which, if not avoided, could result in death or serious injury
 <b>CAUTION:</b>	A hazardous situation which, if not avoided, could result in minor or moderate injury
<b>NOTICE:</b>	Notices are used when there is a risk of equipment damage or decreased performance, but not personal injury.

## Special symbols

Some hazard categories have specific symbols, as shown in the following table.

Electrical hazard	Magnetic fields hazard
 <p><b>Electrical Hazard:</b></p>	 <p><b>CAUTION:</b></p>

## 1.3 User safety

All regulations, codes, and health and safety directives must be observed.

### The site

- Observe lockout/tagout procedures before starting work on the product, such as transportation, installation, maintenance, or service.
- Pay attention to the risks presented by gas and vapors in the work area.
- Always be aware of the area surrounding the equipment, and any hazards posed by the site or nearby equipment.

### Qualified personnel

This product must be installed, operated, and maintained by qualified personnel only.

### Protective equipment and safety devices

- Use personal protective equipment as needed. Examples of personal protective equipment include, but are not limited to, hard hats, safety goggles, protective gloves and shoes, and breathing equipment.
- Make sure that all safety features on the product are functioning and in use at all times when the unit is being operated.

## 1.4 Protecting the environment

### Emissions and waste disposal

Observe the local regulations and codes regarding:

- Reporting of emissions to the appropriate authorities
- Sorting, recycling and disposal of solid or liquid waste
- Clean-up of spills

### Exceptional sites



#### **CAUTION: Radiation Hazard**

Do NOT send the product to Xylem if it has been exposed to nuclear radiation, unless Xylem has been informed and appropriate actions have been agreed upon.

## 1.5 Spare parts



#### **CAUTION:**

Only use the manufacturer's original spare parts to replace any worn or faulty components. The use of unsuitable spare parts may cause malfunctions, damage, and injuries as well as void the warranty.

## 1.6 End of life product disposal

Handle and dispose of all waste in compliance with local laws and regulations and recycle where applicable.

# 2 Transportation and Storage

## 2.1 Examine the delivery

### 2.1.1 Examine the package

1. Examine the package for damaged or missing items upon delivery.
2. Record any damaged or missing items on the receipt and freight bill.
3. If anything is out of order, then file a claim with the shipping company.  
If the product has been picked up at a distributor, make a claim directly to the distributor.

### 2.1.2 Examine the unit

1. Remove packing materials from the product.  
Dispose of all packing materials in accordance with local regulations.
2. To determine whether any parts have been damaged or are missing, examine the product.
3. If applicable, unfasten the product by removing any screws, bolts, or straps.  
Use care around nails and straps.
4. If there is any issue, then contact a sales representative.

## 2.2 Storage guidelines

### Storage location

The product must be stored in a covered and dry location free from heat, dirt, and vibrations.

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**NOTICE:**

Protect the product against humidity, heat sources, and mechanical damage.

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**NOTICE:**

Do not place heavy weights on the packed product.

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# 3 Product Description

## 3.1 Product overview

The CRS removes free and entrained air and separates dirt, sediment, and unwanted material from the hydronic system.

The CRS has the following optional accessories:

- Air vent
- Blowdown valve
- Skim valve

Stainless steel media construction provides durability and long life.

A magnetic separation option is available to remove the black iron oxide (magnetite) suspended in the water. Iron oxide can collect inside pumps, boilers, heat exchangers, and other system components, resulting in substantial loss of system efficiency and possible damage to those components. The separator consists of an innovative magnetic insert assembly, containing multiple high-performing neodymium magnets.

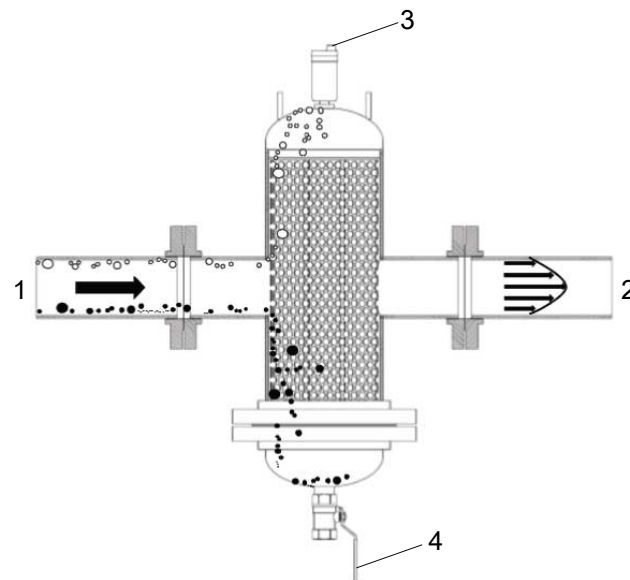
The design and construction of this separator conforms to ASME Section VIII, Div.1. This product is intended for hot and chilled water systems.



### WARNING:

This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

## 3.2 Process description



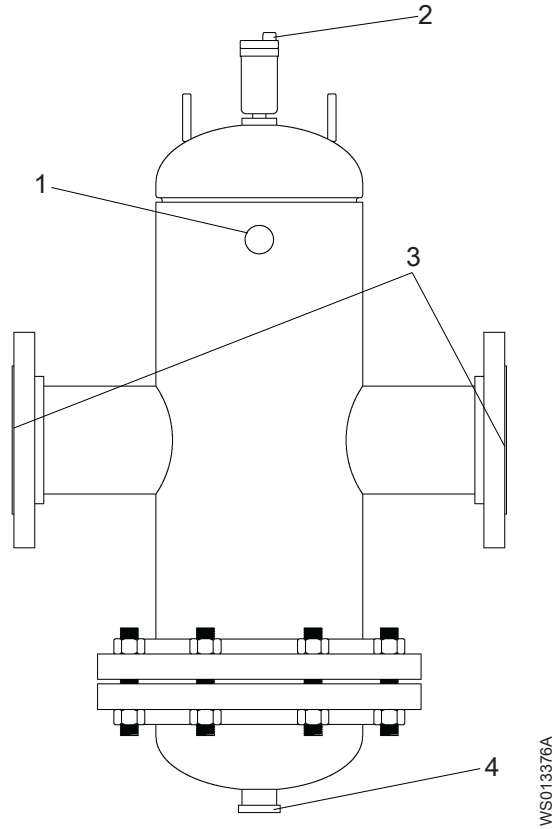
1. Dirt and air laden flow
2. Dirt and air free flow
3. Air vent, optional
4. Blow down valve, optional

- The system water contains the air bubbles, entrained air, dirt particles, sediment, magnetite, and other solid unwanted material.
- The coalescing medium separates the air and solids from the water.
- When the large air bubbles quickly rise to the top of the container, it is flushed out through the vent.

WS013431A

- The entrained air is pulled out of solution and forms microbubbles, which coalesce around the media and form larger bubbles.
- The sediment and dirt particles are strained or filtered from the water and collected in the bottom of the container.
- The magnetite and other ferromagnetic particles are collected by the optional magnetic separator.

### 3.3 Parts



1. Skim valve port
2. Air vent, optional
3. Connection to system
4. Blowdown

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### 3.4 Operational limits

Separator	Temperature	Maximum working pressure
CRS	-20°F (-29°C) to 450°F (232°C)	150 psi (1034 kPa)
CRS with magnetic separation	32°F (0°C) to 250°F (120°C)	150 psi (1034 kPa)



# 4 Installation

## 4.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on page 2 have been read and understood.




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### WARNING: STRONG MAGNETIC FIELD

This product may contain strong magnets which can be harmful to pacemaker wearers and others with medical implants. Those with implanted medical devices must stay back 36 in (90 cm). Keep tools and other loose metal objects away. The magnets in this product are strong enough to pull them from your hand or can cause a loss of balance. To avoid damage, keep magnetic media such as computer discs, credit cards, and tapes away. Failure to follow these instructions could result in serious personal injury, death, and/or

property damage.




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### WARNING:

Do not operate the unit in an area where explosive gases are present.




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### WARNING:

The heating of water and other fluids causes volumetric expansion. The associated forces can cause the failure of system components and the release of high-temperature fluids. In order to prevent this, install properly sized and located compression tanks and pressure-relief valves. Failure to follow these instructions can result in serious personal injury or death, or property damage.




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### WARNING:

This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).




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### CAUTION:

Installation and maintenance must be performed by a qualified professional. Service should not be performed on any component in an active hydronic system. Before attempting to make any required adjustments, properly shut-off the water supply and water heater, drain the lines, and allow the system to reach a safe handling temperature (below 100°F [38°C]) and zero pressure condition. Use proper safety equipment including gloves, goggles, or similar tools to avoid contact with system fluids and common hazards. Failure to follow these instructions could result in personal injury and property damage.




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### CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.




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### CAUTION:

The operator must be aware of safety precautions to prevent physical injury.

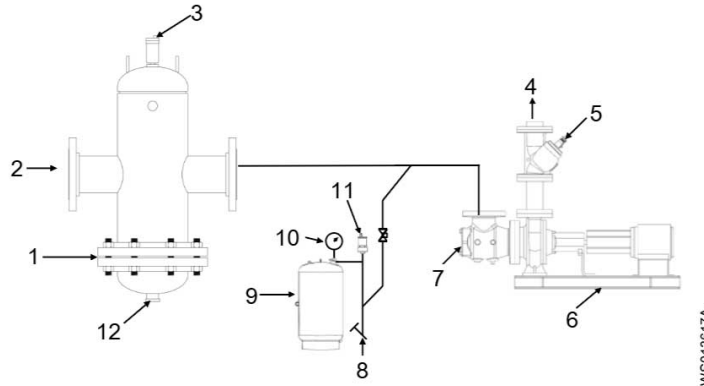
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## 4.2 Prerequisites

- The CRS separator must be installed before the pump inlet to increase the pump performance and seal life.
- The CRS separator must not be installed on a dead pipe or in an overhead joist space.

## 4.3 Install the CRS

1. Before installation, check that the CRS is not damaged.  
If the CRS is damaged, replace the CRS.



1. B&G Series CRS
2. From boiler, chiller, or converter
3. B&G model 98 high capacity air vent (Optional)
4. To system
5. B&G triple duty valve
6. B&G system pump
7. B&G suction diffuser
8. Drain
9. B&G pressurized expansion tank
10. Pressure gauge
11. B&G #7 or #87 air vent
12. Blowdown

2. Install the CRS vertically in the following positions:
  - Air vent port at the top
  - Blow drain port at the bottom

There must be sufficient space for inspection, maintenance, and service.

## 4.4 Pipe hanging installation



### CAUTION: Lifting lugs

Use unit lifting lugs only to lift unit as shipped from factory. Unit must be empty and disconnected from pipe, and other restraints. Use proper rigging procedures. Failure to follow these instructions could result in injury or property damage.

The wet filled weight of the Series CRS separators can exceed the strength of the supports used.

Make sure that provisions are made to properly support the wet filled separator.

Welding to the pressure vessel boundary will void the ASME stamp.

### NOTICE:

Never use the separator itself as a form of piping support. Please support separator and piping according to the local building code. Failure to follow these instructions may result in property damage.

A manual blowdown valve can be added to the blowdown connection at the bottom of the separator. The function of the blowdown valve is to facilitate the purging of sediment from the vessel.

**WARNING: RUPTURE OR EXPLOSION HAZARD**

Like most pressurized tanks, this tank can over time corrode, weaken, and burst or explode. Failure to follow this instruction may result in serious personal injury or death and property damage.

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**WARNING: Chlorine & aggressive water hazard**

The water quality can significantly influence the life of your product. You should test for corrosive elements, acidity, total solids, and other relevant contaminants, including chlorine and treat your water appropriately to insure satisfactory performance and prevent premature failure. Failure to follow this instruction may result in serious personal injury or death and property damage.

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Before filling and starting the operation of a HVAC system, a properly applied and sized pressure relief valve must be installed and in good operating order.

During filling and start-up after servicing, the system pressure should be closely monitored to ensure the pressure does not exceed the pressure relief valve rating.

For more information, see pressure relief valve manufacturer instructions.

## 4.5 Install the insulation

1. To maximize energy savings, attach insulation to the Series CRS after the system has been balanced. Use tape or other acceptable means to secure the insulation to the separator.
  - The insulation must not cover the following components:
    - Air vent
    - Blow down
    - Skim valve port
    - If applicable, magnetic separator
  - The insulation must be installed after the system has been balanced.
2. Provisions must be made to permit removal of the coalescing media and optional magnetic separator assembly and access to the skim valve port.

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# 5 Operation

## 5.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on page 2 have been read and understood.

## 5.2 Start up of the system

1. Flush the CRS to remove the dirt, sediment, magnetite, and other contaminants that are collected in the first 24 to 48 hours.
  - Flushing must be done after the initial circulation, commissioning, and cleaning of the system.
2. During normal service life, flush the CRS annually to remove the dirt, sediment, magnetite, and other contaminants. Open systems that are exposed to the atmosphere, systems that use cast iron piping or retrofit applications may require more frequent servicing.
3. During the initial startup, frequently operate the blowdown valve.
4. After each blowdown operation, record the amount of sediment that is collected and the amount of time since the previous blowdown operation.

Use this information to determine and sufficient blowdown schedule for your system.

If left in position, a noticeable increase in pressure drop may be observed as the separator becomes clogged and starts restricting flow through the device. This can negatively impact system efficiency.

For more information about flushing the CRS, consult local sales and service representative.

## 5.3 System venting and purging



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### CAUTION:

Uncontrolled venting of water can occur with automatic air vents if foreign material prevents vent from closing. Unwanted flow should be directed to a drain. Failure to follow these instructions could result in property damage and/or moderate personal injury.

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- After initial venting and purging of air from the system, more air will be released from the water as it is heated.
- An optional Bell & Gossett No. 107A air vent may be assembled at the top of the Series CRS separator.
- If the system has multiple loops or zones, the supply water for all loops and zones must pass through the Series CRS separator for complete and continuous air removal.
- In case the piping arrangement does not permit the installation of a single separator on the main, additional separators must be installed on each loop or zone. In this event, only one expansion tank is required for the system.
- The air vents must be installed on high points in the system.
- A port is provided towards the top of the separator for installation of an optional skim valve.
- A skim valve is used during system filling, and during system maintenance, to eliminate the floating debris that may have collected in the separator as the system is being filled.
- The skim port must not be used for filling the system or to add make-up water during operation.

# 6 Maintenance

## 6.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on page 2 have been read and understood.

## 6.2 Examine the CRS




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### WARNING:

Corrosion or leakage are indications that the Series CRS coalescing removal separator must be replaced. Failure to follow these instructions could result in serious personal injury or death and property damage.

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Examine the CRS for leaks and corrosion.

## 6.3 Clean the coalescing medium




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### CAUTION:

Installation and maintenance must be performed by a qualified professional. Service should not be performed on any component in an active hydronic system. Before attempting to make any required adjustments, properly shut-off the water supply and water heater, drain the lines, and allow the system to reach a safe handling temperature (below 100°F [38°C]) and zero pressure condition. Use proper safety equipment including gloves, goggles, or similar tools to avoid contact with system fluids and common hazards. Failure to follow these instructions could result in personal injury and property damage.

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The coalescing medium must be cleaned periodically.

### 6.3.1 Close the isolation valve

1. Before closing the isolation valves, check the following parameters:
  - The system water is allowed to reach a safe handling temperature.
  - The separator to reach a zero pressure condition.
2. Close the isolation valves to isolate the CRS from the system.

### 6.3.2 Drain the fluid

1. Open the blowdown valve at the bottom of the separator to drain the contaminants.
2. Use the applicable equipment to drain the fluid.
3. Check that all the water flow from the blowdown valve has stopped.  
If the water continues to flow, the system isolation valves must be repaired or replaced before continuing.

### 6.3.3 Remove the coalescing medium

1. Remove the flange bolts of housing cover of coalescing medium from the bottom of the separator.  
It is applicable for series CRS separators with the removable heads.
2. Remove the coalescing medium from the series CRS separator.

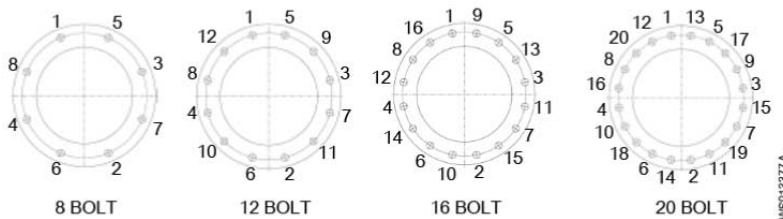
### 6.3.4 Install the CRS

1. Clean the coalescing medium.
2. Install the coalescing medium in the series CRS separator.
3. Remove the gasket of cover head.

4. Dispose of the old gasket.
5. Replace the cover head gasket with a new one.
6. Install the housing cover.
7. Tighten the flange bolts.

The bolts must be tightened in increments of 30%, 60%, and 100%:

Connection size, in (mm)	Body size, in (mm)	Bolt size, in (mm)	Number of bolts	Torque, lbf.ft (Nm) 150# flanges Dry	Torque, lbf.ft (Nm) 150# flanges Lubricated
2 (50.8)	6.5 (165.1)	3/4 (19)	8	250 (339)	175 (237.2)
2.5 (63.5)	6.5 (165.1)	3/4 (19)	8	250 (339)	175 (237.2)
3 (76.2)	6.5 (165.1)	3/4 (19)	8	250 (339)	175 (237.2)
4 (101.6)	8 (203.2)	3/4 (19)	8	250 (339)	175 (237.2)
5 (127)	10 (254)	7/8 (22.2)	12	400 (542.3)	275 (373)
6 (152.4)	12 (304.8)	7/8 (22.2)	12	400 (542.3)	275 (373)
8 (203.2)	16 (406.4)	1 (25.4)	16	600 (813.4)	425 (576.2)
10 (254)	20 (508)	1.12 (28.5)	20	1000 (1355.8)	700 (950)
12 (304.8)	24 (609.6)	1.25 (31.7)	20	1400 (1898.1)	1000 (1355.8)



8. Close the blowdown valve at the bottom of CRS.
9. Open the isolation valves.

## 6.4 Clean the magnetic insert

### 6.4.1 Close the isolation valve

1. Before closing the isolation valves, check the following parameters:
  - The system water is allowed to reach a safe handling temperature.
  - The separator to reach a zero pressure condition.
2. Close the isolation valves to isolate the CRS from the system.

### 6.4.2 Remove the magnetic insert



#### WARNING: STRONG MAGNETIC FIELD

This product may contain strong magnets which can be harmful to pacemaker wearers and others with medical implants. Those with implanted medical devices must stay back 36 in (90 cm). Keep tools and other loose metal objects away. The magnets in this product are strong enough to pull them from your hand or can cause a loss of balance. To avoid damage, keep magnetic media such as computer discs, credit cards, and tapes away. Failure to follow these instructions could result in serious personal injury, death, and/or



property damage.

1. Remove the (4) #10-32 screws with a 5/32 inch hex Allen key.
2. Carefully slide the magnetic insert out from the bottom port of the series CRS separator.

### 6.4.3 Drain the fluid

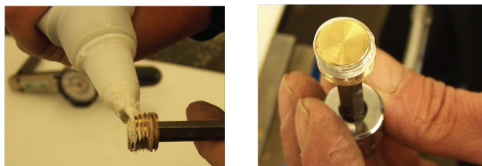
1. Wait for 10 minutes before flushing the separator.
  1. Allows the residual magnetic field from the magnet insert to dissipate
  2. Drains the magnetite and other contaminants during system flushing.
2. Open the skim valve at the top of the coalescing separator to release any trapped air.
3. Open the adjacent blowdown at the bottom of the series CRS separator to drain the contaminants.
4. Use applicable equipment to drain the fluid.
5. Dispose of the fluid in accordance with local regulations.

### 6.4.4 Install the magnetic insert

1. Carefully open the upstream isolation valve nearest to the coalescing separator.  
The flushing must continue until the system fluid runs clear.
2. Close the separator blowdown.
3. Close the skim valve.
4. Insert the magnetic insert into the separator.
5. Use a torque wrench to tighten the screws.  
The torque must be 24.0 lbf.in +4.0 lbf.in / -0 (2.7 Nm +0.5 Nm / -0).
6. Open the upstream isolation valves.
7. Open the downstream isolation valves.

## 6.5 Service the air bleed ports or drain plugs

1. Remove the required component from the magnetic separator.
2. Clean the old thread sealant by using a wire brush.
3. Allow the separator and the component to dry.  
If damaged, replace the component or separator.
4. Apply the 360° bead of Loctite 567<sup>1</sup> thread sealant or lubricant.  
RectorSeal No. 5 pipe thread sealant for all non-glycol based applications or any PTFE thread sealing tape must be used as sealant.  
For more information, see Loctite handling precautions.



5. Install the component in the CRS.
6. Use a torque wrench to tighten the component.

Component	Torque
Air bleed port	14.7 lbf.ft (20.0 Nm) to 5.0 lbf.ft (6.7 Nm)
Drain plug	99.6 lbf.ft (135.0 Nm) to 30.0 lbf.ft (40.6 Nm)

7. Apply a 100 psi or less pressure on the assembled component.
8. For maximum pressure resistance, allow the Loctite 567 or RectorSeal No. 5 thread sealant to cure for 24 hours.

<sup>1</sup> Loctite and Loctite 567 are registered trademarks of Henkel AG & Co. RectorSeal No. 5 is a registered trademark of RectorSeal Corporation.

The PTFE tape typically does not require curing to achieve the maximum pressure resistance.









# Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

**For more information on how Xylem can help you, go to [www.xylem.com](http://www.xylem.com)**



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